

Math 2201 Review For Final

Unit One:

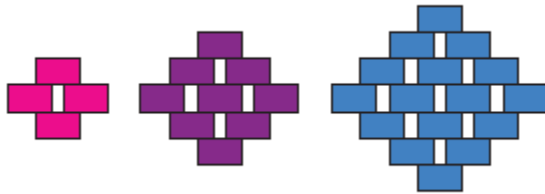
1) Find the next item in each pattern (1 point each):

(a) January, March, May, ...

(a) \_\_\_\_\_

(b)

(b)



(c) 4, 7, 12, 19, 28, ...

(c) \_\_\_\_\_

2) Write a conjecture about the product of an even number and an odd number (2 points).

3) Provide a counterexample to show that each statement is false (1 each).

(a) If a number is divisible by 5, then it is divisible by 10.

(b) For every integer  $n$ ,  $n^3$  is positive.

(c) If  $x$  is a prime number, then  $x + 1$  is NOT prime.

(d) For any number  $n$ ,  $2n > n$ .

4) Use deductive reasoning to prove the following statements (4 each):

(a) The **sum** of **any three consecutive even numbers** is **divisible by three**.

(b) The **product** of **any two odd numbers** is an **odd number**.

- 5) Use inductive reasoning to make a conjecture for the magic trick shown below.  
Then use deductive reasoning to prove your conjecture.

Step 1: Choose a number

Step 2: Add 3

Step 3: Mutiply by 2

Step 4: Add 4

Step 5: Divide by 2

Step 6: Subtract the number you started with

- 6) Dan is a high school student. All high school students like soccer. Therefore, Dan likes soccer. Where is the error in the reasoning? (1 point)
- 7) Shelby was trying to prove the following number trick: Choose any number. Double your number. Add 20. Divide by 2. Subtract the original number. Each time Shelby tries the trick, she ends up with 10. Her proof, however, does not give the same result.

$n$  Choose any number

$2n$  Double your number

$2n + 20$  Add 20

$n + 20$  Divide by 2

$n + 20 - n$  Subtract the original number

20

Where did Shelby make a mistake? (1 point)

- 8) Lisa draws four parallelograms and measures all sides. She writes the statement "*The opposite sides of a parallelogram are equal*" in her notebook. Which term best describes her statement?
- (A) conjecture
- (B) counterexample
- (C) deductive reasoning

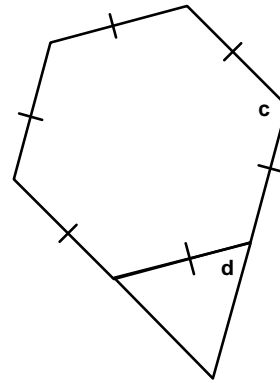
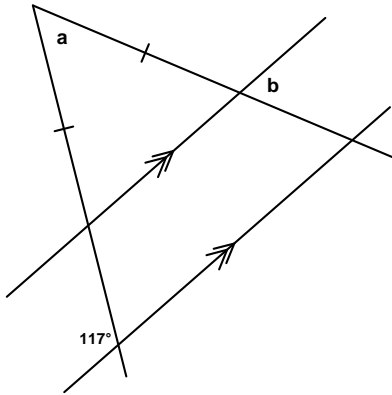
(D) inductive reasoning

9) What is the missing seventh term in the given sequence?

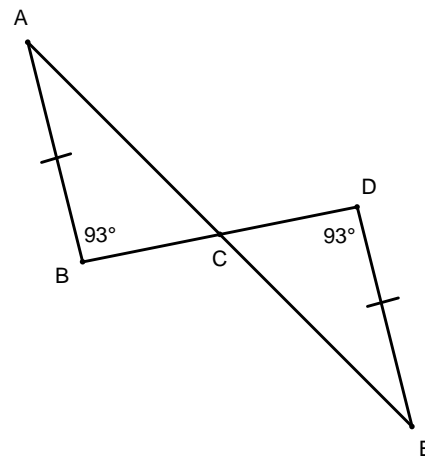
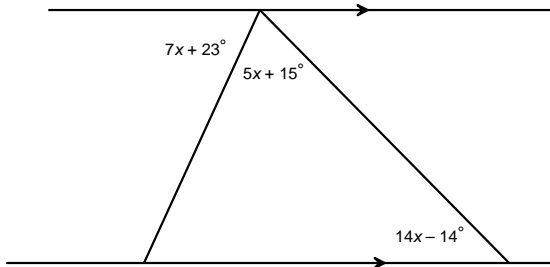
{1, 1, 2, 3, 5, 8, 1, 21}

**Unit Two:**

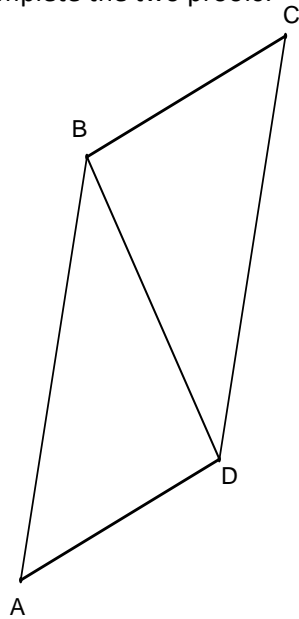
1) Find the missing angle measure.



2) Solve for x and find the angle measures.



3) **Proofs:** Complete the two proofs:

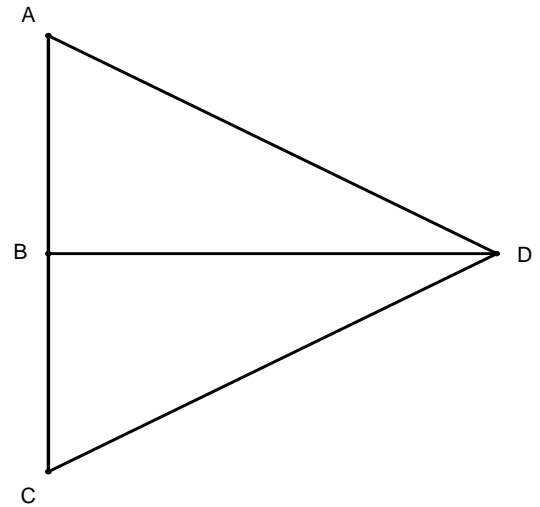


Given:  $AB \parallel CD$

$BC \parallel AD$

Prove:  $\triangle ABD \cong \triangle CDB$

$AD = CB$



Given:  $\triangle ADC$  is Isosceles

B is the midpoint of AC

Prove:  $\triangle ABD \cong \triangle CBD$

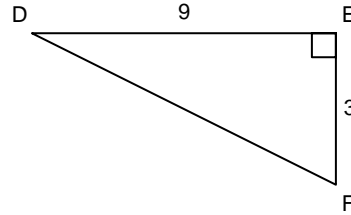
$\angle ADB = \angle CDB$



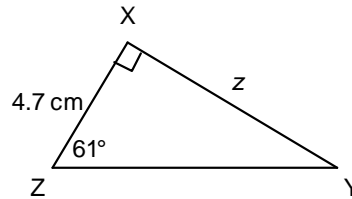


**Unit Three:**

- 1) Determine the measure of  $\angle D$  to the nearest tenth of a degree.

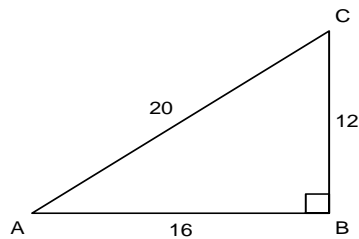


- 2) Determine the length of side z to the nearest tenth of a centimetre.

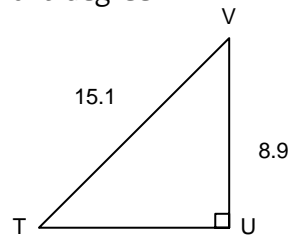


- 3) A flagpole casts a shadow that is 21 m long when the angle between the sun's rays and the ground is  $48^\circ$ . Determine the height of the flagpole, to the nearest metre.

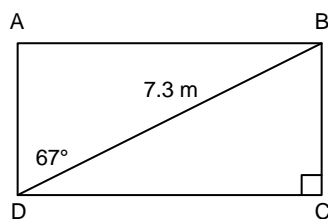
- 4) Determine  $\sin A$  and  $\cos A$  to the nearest tenth.



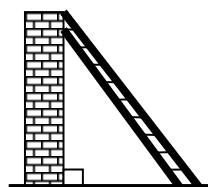
- 5) Determine the measure of  $\angle V$  to the nearest tenth of a degree.



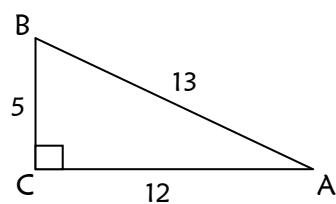
- 6) Calculate the length of this rectangle to the nearest tenth of a metre.



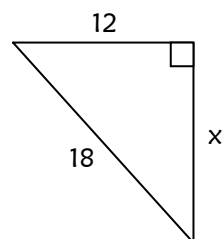
- 7) A ladder which is 6 m in length is resting against a house. The ladder makes an angle of  $20^\circ$  with the ground. How far from the base of the house is the ladder touching the ground?



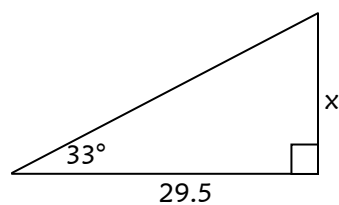
- 8) Which of the following is the correct ratio for  $\cos A$ ?



- 9) Determine the value of  $x$ .

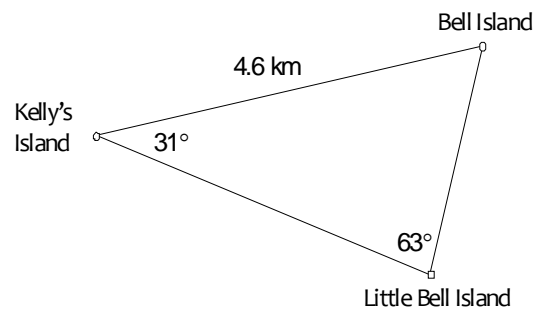


- 10) What is the value of  $x$  in the diagram below?

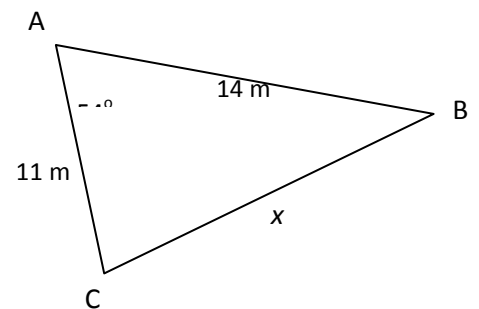




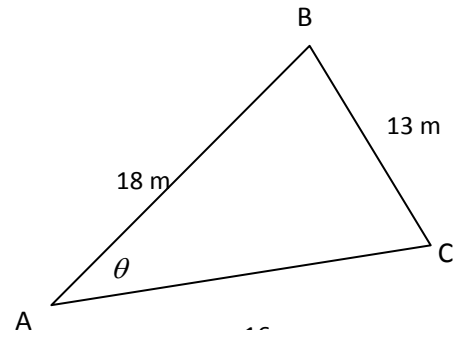
- 11) The straight-line distance between Kelly's Island and Bell Island is 4.6 km. Bonita and John want to take their boat from Kelly's Island to the tip of Little Bell Island. How far will they travel in total? Give your answer to the nearest tenth of a metre.



- 12) Find the missing value of  $x$  in the following triangle to the nearest meter.



- 13) Find the measure of  $\theta$  to the nearest degree in the following triangle.



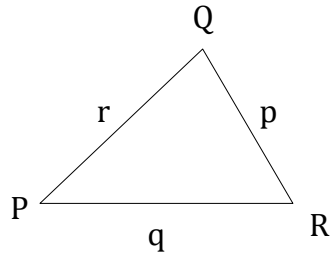
14) Which expression is equal to  $\sin Q$  ?

(A)  $\frac{q}{r \sin R}$

(B)  $\frac{r}{q \sin R}$

(C)  $\frac{q \sin R}{r}$

(D)  $\frac{r \sin R}{q}$



1) Arrange the numbers in increasing order.

$$4, 4\sqrt{2}, \sqrt{15}, 2\sqrt{5}, \text{ and } \sqrt{27}$$

2) Which restrictions apply to the variable in  $8\sqrt{x^2}$  ?

3) Which set contains like radicals?

**A.**  $6\sqrt{2}, 2\sqrt{16}, -\sqrt{4}, 21\sqrt{6}$

**B.**  $-3\sqrt{3}, 2\sqrt{27}, -\sqrt{45}, \frac{1}{3}\sqrt{54}$

**C.**  $5\sqrt{3}, -\sqrt{9}, 2\sqrt{6}, \sqrt{36}$

**D.**  $-\sqrt[3]{8}, -\sqrt{50}, 2\sqrt{16}, \sqrt[3]{54}$

4) Which expressions are equivalent to  $(5\sqrt{7})(\sqrt{21})$  in simplest form and entire form?

**A.**  $35\sqrt{3}, \sqrt{147}$

**B.**  $245\sqrt{3}, \sqrt{3675}$

**C.**  $35\sqrt{3}, \sqrt{735}$

**D.**  $35\sqrt{3}, \sqrt{3675}$

5) Rationalize  $\frac{9\sqrt{7}}{\sqrt{35}}$  ?

6) What is the value of  $x$  in  $5\sqrt{x} = 25$  ?

7) How many solutions are there for  $x = \sqrt{2-x}$  ?

8) Simplify  $\sqrt{7} - \sqrt{28} + 3\sqrt{63}$

9) What is the value of  $x$  in  $\sqrt[3]{x-6} = 4$  ?

10) Express  $5\sqrt[3]{9}$  as an entire radical.

11) Convert  $\sqrt{180} - \sqrt{320} + \sqrt{48}$  into mixed radical form. Then simplify

12) State any restrictions on the variable, then multiply.

$$(2\sqrt{x} - 5)(-3\sqrt{x} - 1)$$

13) State any restrictions on the variable, then divide.

$$\frac{7\sqrt{a^3}}{\sqrt{49a^4}}$$

14) Simplify  $6x\sqrt{x^5}(\sqrt{x} - 3\sqrt{x^3})$ .

15) State any restrictions on  $y$ , then solve  $\sqrt{y-1} + 7 = 13$ . Verify your answer.

16) Brad was asked to simplify  $2\sqrt[3]{64x^9}$  but did not complete a correct solution. Which step contains his **first** error?

*Solution:*

**Step 1:**  $2 \cdot \sqrt[3]{64} \cdot \sqrt[3]{x^9}$

**Step 2:**  $2 \cdot 8 \cdot \sqrt[3]{x^9} \cdot \sqrt[3]{x^9}$

**Step 3:**  $2 \cdot 8 \cdot x \cdot \sqrt[3]{x^9}$

**Step 4:**  $18x \sqrt[3]{x^9}$

17) What are the restrictions on the variable for  $\frac{1}{\sqrt{x-1}}$  ?

18) Simplify:  $(3\sqrt{2} - \sqrt{10})^2$

19) State the **restrictions** on  $x$ , **solve** the equation, and **check** for extraneous roots.

$$4 - \sqrt{2x + 1} = 9$$

**Unit Five:**

1) Determine the range, mean and median of the following test scores.

History Test 1 Scores (out of 100)

90	84	77	66
89	84	77	65
86	82	75	65
86	81	72	61
84	79	70	56

2) A set of data is normally distributed. What percent of the data is within one standard deviation of the mean?

3) The ages of participants in a bonspiel are normally distributed, with a mean of 40 and a standard deviation of 10 years. What percent of the curlers are between 40 and 50?

4) Determine the  $z$ -score for the given value.  
 $\mu = 52, \sigma = 6, x = 64$

5) Determine the percent of data between the following  $z$ -scores:  
 $z = -1.50$  and  $z = 1.50$ .

- 6) A poll was conducted about an upcoming election. The results are considered accurate within  $\pm 2.7$  percent points, 19 times out of 20.  
State the confidence level.
- 7) The results of a survey have a confidence interval of 56.0% to 64.6%, 9 times out of 10.  
Determine the margin of error.
- 8) A poll was conducted about an upcoming election. The result that 54% of people intend to vote for one of the candidates is considered accurate within  $\pm 7.1$  percent points, 19 times out of 20.  
State the confidence interval.
- 9) In a recent survey of high school students, 72% of those surveyed agreed that school should start half an hour later. The survey is considered accurate to within 3.5 percent points, 19 times out of 20.  
If a high school has 1200 students, state the range of the number of students who would agree with the survey.
- 10) The results of a survey have a confidence interval of 77.2% to 91.6%, 99 times out of 100.  
Determine the margin of error.
- 11) Khamid and Gerbrand are laying interlocking bricks. Their supervisor records how many bricks they lay each hour.

Hour	1	2	3	4	5	6
Khamid	212	193	204	195	182	216
Gerbrand	230	195	214	207	218	191

Which worker is more consistent?

- 12) Which set of data has the lowest standard deviation?

- (A) ~~{0.1, 0.2, 0.3, 0.4, 0.5}~~
- (B) ~~{3.5, 3.6, 3.7, 3.8, 3.9}~~
- (C) ~~{4, 4, 5, 5, 6}~~
- (D) ~~{9, 9, 9, 9, 9}~~

- 13) The ages of participants in a curling bonspiel are normally distributed with a mean of 45 years and a standard deviation of 9 years. What percent of the curlers are between 36 and 54

years of age?

- 14) The heights of all students in a class were measured. It was later discovered that the tape measure used was inaccurate and 5 mm had to be added to each person's height. Which calculation would stay the same based on the new height measures?
- (A) central tendency
  - (B) mean
  - (C) median
  - (D) standard deviation
- 15) In a pre-election survey in St. John's, 32% of those surveyed were undecided about their choice for mayor. The survey is considered accurate within 8 percentage points, 99 times out of 100. If there are 102 000 eligible voters in St. John's, state the **range** of the number of people who are undecided and the **confidence level**.
- 16) A manufacturer produces tires that have an average thickness of 179 mm, with a standard deviation of 0.9 mm. To be classified as "supreme quality", tires must have a thickness between 177.8 mm and 180.7 mm. What percent, to the nearest whole number, of the total production can be rated as "supreme quality" tires?

**Unit Six:**

1) Which of the following quadratic functions would have the widest graph.

A)  $f(x) = x^2 - 2x + 1$

B)  $f(x) = -3x^2 + 5x + 3$

C)  $f(x) = \frac{2}{8}x^2 - 5x - 6$

D)  $f(x) = -2x^2 - 2x + 7$

2) State the range of each of the following functions.

A)  $y = -2x^2 + 8x - 6$

B)  $f(x) = 3x^2 + 24x - 2$

C)  $y = (x - 2)(x + 8)$

3) Graph the following functions. For each function state

i) The axis of symmetry

ii) Vertex

iii) Y-intercept

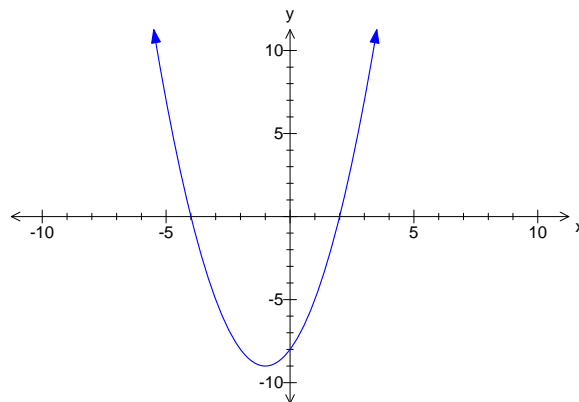
iv) At least two points different than the vertex

A)  $y = 3x^2 - 15x + 5$

B)  $f(x) = 3(x + 2)(x - 4)$

4) What is the axis of symmetry for the quadratic function passing through points (-2, 5) and (8, 5)?

5) Determine the equation of the quadratic function below in factored form. Be sure to state the vertex and axis of symmetry.



6) What is the vertex of the graph of the function  $y = 2x^2 + 12x + 18$ ?

7) What is the equation of the axis of symmetry for  $y = 2x - x^2 + 1$ ?

8) Given the equation  $y = 2(x - 3)^2 - 7$

A) State the direction of opening



- B) State the axis of symmetry and the vertex  
 C) State the domain and range  
 D) Graph the parabola
- 9) Determine the vertex form of a quadratic function with zeros -4 and -2, if the point (-1, -9) is also on the graph of the function.
- 10) State the vertex, axis of symmetry, and range for  $f(x) = -3(x - 2)^2 + 7$
- 11) Sketch the graph of  $y = 3(x - 1)^2 + 4$ . Be sure to state the domain and range of the function.
- 12) Dimples the clown has been charging \$260 to perform at a children's party. He is too busy to keep up with his bookings. He thinks that charging more for his performances will result in fewer bookings but more revenue. If he raises the charge by \$80 per party he expects to get one fewer booking per month. He performs at 20 children's parties each month at his current price. What price should he charge to maximize his monthly revenue?
- 13) Workers who were improving a section of highway near Rogers Pass, BC, used dynamite to remove a rock obstruction. When the rock shattered, the height of one piece of rock,  $h(t)$ , in feet could be modelled by the function  $h(t) = -16t^2 + 160t$  where  $t$  represents the time in seconds after the blast. What was the maximum height of the piece of rock?
- 14) A quadratic function has an x-intercept at  $(-7, 0)$  and an axis of symmetry at  $x = -1$ . What is the other x-intercept?
- 15) If  $(-1, 3)$  is the vertex of  $y = 2x^2 + bx + 5$ , what is the value of  $b$ ?
- 16) Which represents a quadratic function with no x-intercepts?
- (A)  $y = -(x - 1)^2$   
 (B)  $y = -(x - 1)^2 + 3$   
 (C)  $y = (x + 1)^2 - 8$   
 (D)  $y = (x + 1)^2 + 8$

Unit Seven:

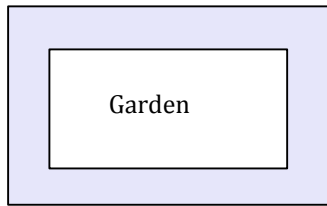
1) Which function has zeros of  $-3$  and  $7$  ?

- (A)  $f(x) = (x - 3)(x - 7)$
- (B)  $f(x) = (x - 3)(x + 7)$
- (C)  $f(x) = (x + 3)(x - 7)$
- (D)  $f(x) = (x + 3)(x + 7)$

2) What are the roots of the quadratic equation  $x^2 + 6x - 16 = 0$  ?

3) Use a quadratic function to model and solve the given problem:

A landscaper is designing a  $6\text{ m}$  by  $8\text{ m}$  rectangular garden that will then be surrounded by a uniform border of crushed stone. She has enough crushed stone to cover  $72\text{ m}^2$ . What is the width of the border if she uses all of the crushed stone?



4) Nicole designed a rectangular crest that was  $8\text{ cm}$  by  $10\text{ cm}$  for her school's jacket. The crest was then enlarged to create a poster that had an area of  $980\text{ cm}^2$ . What are the dimensions of the poster?

5) Solve by factoring:

a)  $x^2 - 7x + 10 = 0$

b)  $x^2 + 8x = 20$

6) Use the quadratic formula to solve:

a)  $2x^2 - x - 2 = 0$

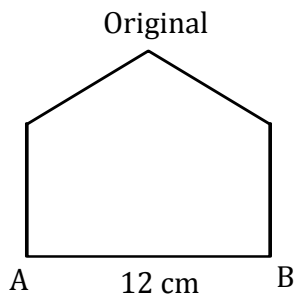
b)  $x^2 + 4x = 8$

**Unit Eight:**

1) Which has a unit rate of  $\$0.16/\text{apple}$ ?

- (A) 20 apples for \$3.00
- (B) 25 apples for \$4.25
- (C) 30 apples for \$4.95
- (D) 35 apples for \$5.60

- 2) The pentagon shown is transformed by a scale factor of  $\frac{1}{4}$ . What is the length of the image of side AB?



- (A) 3 cm
  - (B) 9 cm
  - (C) 15cm
  - (D) 48 cm
- 3) A partially inflated heart-shaped balloon is 15 cm wide and has a volume of 1600 cm<sup>3</sup>. If air is added until the balloon is 30 cm wide, what is the new volume?
- (A) 3200 cm<sup>3</sup>
  - (B) 6400 cm<sup>3</sup>
  - (C) 9600 cm<sup>3</sup>
  - (D) 12 800 cm<sup>3</sup>
- 4) Sean buys a package of 15 pencils for \$4.50 at Walmart. Angela buys a box of 50 at Costco for \$14.00. Which is the better buy?
- 5) The following table represents the average cost per litre of gas in NL. Using a graph determine between which months the cost per litre of gas decreased the least amount. Give reasons for your answer.

Month	January	February	March	April	May	June
Cost/volume (\$/L)	121.2	123.6	131.4	139.2	133.1	131.9

- 6) Betty earns \$463.25 in 5 weeks. How much will she earn in 2 years?

- 7) A circle has been transformed so that its image radius is 14cm. If the scale factor is 0.4, what is the radius of the original circle?
- 8) A dinosaur model has a scale of 1:12. If the head of the dinosaur model is 8cm in length, how long is the head of the real dinosaur?
- 9) Chad and Charlene painted a mural on the wall, measuring 12 ft by 8 ft using an overhead projector. If the original sketch had an area of  $216 \text{ ft}^2$ , what is the scale factor?
- 10) During an Art class, students are projecting the image of a Carnation milk can on the wall. The projector applies a scale factor of 250%. If the can has a diameter of 10 cm and a height of 12.5 cm, what are the dimensions of the image on the wall?
- 11) The surface area of a cone is  $36 \text{ ft}^2$ . What is the surface area of its image if a scale factor of 1 : 4 is applied?
- 12) Find the volume of a cylinder if its image has a volume of  $450 \text{ cm}^3$  and a scale factor of 2:3.
- 13) What is the scale factor of a pair of similar spheres if the original has a surface area of  $248 \text{ cm}^2$  and its image  $1518.75 \text{ cm}^2$ .